THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 46

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TAKEO YOSHIDA, YOSHIKAZU NAKAMURA,
MINORU SUZUKI and RYOICHI HIRAI

Appeal No. 1997-4373
Application No. 08/332,656[1]

HEARD: October 4, 1999

Before PATE, McQUADE and BAHR, Administrative Patent Judges.

BAHR, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1 through 6, 23 and 25 through 27. Claims 7 through 22, 24 and 28 have been indicated as allowable by the examiner (answer, Paper No. 38, page 2).

[1] Application for patent filed November 1, 1994. According to the appellants, the application is a continuation of Application No. 07/753,708, filed September 3, 1991, now abandoned.

We REVERSE.

BACKGROUND

The appellants' invention relates to a high pressure fuel injection system for an internal combustion engine and a fuel injection pump. An understanding of the invention can be derived from a reading of exemplary claims 1 and 23, which read as follows:

> 1. A high pressure fuel injection system for an internal combustion engine comprising a fuel injector having chamber to which fuel under pressure is delivered and which communicates with the engine through an injector valve, a high pressure fuel injection pump having an output port in which a delivery valve is positioned, conduit means interconnecting said high pressure fuel injection pump output port with said fuel injector for delivering fuel thereto, means positioned downstream of said delivery valve for sensing the pressure in said conduit means, and means positioned downstream of said delivery valve for reducing the pressure in said conduit downstream of said delivery valve in response to engine running conditions for providing the desired amount of fuel discharge by said fuel injector.

> 23. A high pressure fuel injection pump comprising a bore, a plunger reciprocating in said bore for pressurizing fuel therein, a delivery passage having a delivery valve at the end of said bore for discharging fluid pumped by said plunger, a release passage intersecting said bore at a point intermediate the ends of the stroke of said plunger, and control valve means for selectively opening and closing said release valve passage for controlling the pressure output by said plunger.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Abe et al. (Abe)	4,730,585	Mar. 15, 1988
Paganon et al. (Paganon)	4,793,313	Dec. 27, 1988
Fujimori et al. (Fujimori)	4,920,942	May 1, 1990
Masahiko et al. (Masahiko)	EP 243,871	Nov. 4, 1987[2]

The following rejections are before us for review.

1. Claims 1 and 2 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Fujimori.

2. Claims 3 through 5 stand rejected under 35 U.S.C. § 103 as being unpatentable over Fujimori in view of Masahiko.

3. Claim 6 stands rejected under 35 U.S.C. § 103 as being unpatentable over Fujimori in view of Masahiko, as applied to claim 5 above, and further in view of Paganon.

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[2] The examiner and appellants have referred to this reference as "Fujisawa" in the brief, reply brief, answer and supplemental answer.

4. Claim 27 stands rejected under 35 U.S.C. § 103 as being unpatentable over Fujimori and Masahiko, as applied to claim 3 above, and further in view of Abe.

5. Claims 23, 25 and 26 stand rejected under 35 U.S.C. § 103 as being unpatentable over Masahiko in view of Abe.

Reference is made to the examiner's answer (Paper No. 38) and supplemental answer (Paper No. 40) and Paper No. 39 and the reply brief (Paper No. 42) for the respective positions of the examiner and the appellants with regard to the merits of these rejections.[3]

OPINION

In reaching our decision in this appeal, we have given careful consideration to the appellants' specification and claims[4], to the applied prior art references, and to the

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[3] The answer included new grounds of rejection of claims 1 through 6, 23 and 25 through 27. In response thereto, the appellants (Paper No. 39) filed an amendment to claim 1 and arguments directed to the rejection of claims 23, 25 and 26. In response to that amendment, the examiner mailed a supplemental answer (Paper No. 40) including further new grounds of rejection of claims 1 through 6 and 27 and maintaining the rejection of claims 23, 25 and 26 set forth in the answer.

[4] The recitation in claim 1 of "means positioned downstream of said delivery valve for sensing the pressure in said conduit means," appears to be inconsistent with the disclosure on pages 21 and 23 of the appellants' specification, which indicates that the pressure sensor (168) communicates with and senses pressure in the plunger bore (61), which is upstream of the

respective positions articulated by the appellants and the examiner. As a consequence of our review, we make the determinations which follow.

Anticipation is established only when a single prior art reference discloses, expressly or under the principles of inherency, each and every element of a claimed invention. RCA Corp. v. Applied Digital Data Sys., Inc., 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir. 1984). In other words, there must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention. Scripps Clinic & Research Found. v. Genentech Inc., 927 F.2d 1565, 1576, 18 USPQ2d 1001, 1010 (Fed. Cir. 1991). With regard to claim 1, the appellants argue that Fujimori lacks, *inter alia*, a delivery valve positioned in the output port of the fuel injection pump (reply brief, page 3) and the examiner has not responded to that argument. The examiner's only explanation with regard to the limitations of claim 1 is that "[i]n particular, the

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delivery valve (65). Additionally, "said conduit" in claim 1, line 7, and "the pumping stroke" in claim 27 lack clear antecedent basis in the claims. These issues should be addressed in the event of any further prosecution before the examiner.

embodiment of Figure 1 [of Fujimori] shows all of the limitations of these claims" (supplemental answer, page 2). We do not find any illustration of a delivery valve at an output port of the pump in Figure 1 or in the discussion of Figure 1. While Figure 6 does illustrate structure in the outlet port (43) of the fuel pump (1) which *appears* to be a spring-biased check valve, Fujimori does not provide a reference numeral for this structure or discuss any valve at the output port. Thus, we cannot, with any degree of certainty, ascertain whether the illustrated structure is a valve. Under these circumstances we cannot agree with the examiner that Fujimori anticipates the subject matter of claim 1.

It is well established that an anticipation rejection cannot be predicated on an ambiguous reference. Rather, statements and drawings in a reference relied on to prove anticipation must be so clear and explicit that those skilled in the art will have no difficulty in ascertaining their meaning. See In re Turlay, 304 F.2d 893, 899, 134 USPQ 355, 360 (CCPA 1962).

Accordingly, we are constrained to reverse the examiner's rejection of claim 1, and claim 2 which depends therefrom, as being anticipated by Fujimori.

As to the 35 U.S.C. § 103 rejections of claims 3 through 6 and 27 which depend from claim 1, we have reviewed the teachings of Masahiko, Paganon and Abe but find nothing therein which overcomes the above-noted deficiency of Fujimori. In particular, while Masahiko and Abe both disclose high pressure fuel injection pumps having delivery valves at the output ports thereof, these delivery valves are disposed on positive displacement, plunger-type pumps, not on electric turbine pumps such as the Fujimori pump, and we find no suggestion in any of these references to either replace the turbine pump of Fujimori with a plunger-type pump as disclosed by Masahiko or Abe or to provide a delivery valve in the output port of the turbine pump of Fujimori.

Moreover, with further regard to claims 3 through 5, which require that the pressure reducing valve be solenoid operated, Fujimori's objective is to maintain a constant pressure differential between the delivery pressure of the pump and the inner pressure of the intake manifold (abstract).

Fujimori accomplishes this by means of a pressure regulating valve (6) which acts to maintain a constant pressure differential between the delivery pressure and the intake manifold pressure.

Masahiko discloses a solenoid operated spill valve (46, 47, 48) for use in regulating the effective duration of pump stroke to supply the necessary amount of fuel to maintain a desired delivery pressure calculated in response to detected values of engine speed, load and fuel pressure (pages 6 to 8 and 22). The solenoid valve of Masahiko is not used for maintaining a pressure differential and, thus, would not have commended itself to one of ordinary skill in the art as a substitute for the pressure regulating valve (6) of Fujimori.

With further regard to the rejection of claim 6, which depends from claim 5, we have reviewed the teachings of Paganon, but find nothing therein which overcomes the deficiencies of the Fujimori and Masahiko combination discussed above.

Further, with regard to claim 27, we find no suggestion in the applied references to provide a pressure reducing means which acts only at the beginning of the pumping stroke in the

Fujimori pump. In particular, the upstream pressure reducing arrangement (passage 26 and variable volume chamber 39) of Abe is intended to effect a reduction in pressure for a short duration during the stroke to deliver a pilot pulse, as discussed in column 7, line 33, to column 9, line 56, and illustrated in Figures 5A through 6, directly to the engine via a fuel injection nozzle (13). Such a pilot pulse is desirable to reduce combustion noise and nitrogen oxide emissions at low speed (column 1, lines 14 to 22). As Fujimori seeks to maintain a constant pressure differential between the intake manifold and delivery pressures, and as the actual injection pulse delivered to the engine is determined by the injector driving circuit (111) and not by the pump output, one of ordinary skill in the art would not have been motivated to provide the pressure reducing arrangement taught by Abe on the Fujimori pump to produce such a pilot pulse at the output of the pump.

For all of the foregoing reasons, we also reverse the examiner's 35 U.S.C. § 103 rejections of claims 3 through 6 and 27.

Turning finally to the examiner's 35 U.S.C. § 103 rejection of claims 23, 25 and 26 as being unpatentable over Masahiko in view of Abe, the examiner finds that the spill passage (58, 59, 60) of Masahiko does not intersect the bore "at a point intermediate the ends of the stroke of said plunger" as required by claim 23. However, the examiner points out that Abe teaches an embodiment (Figure 12) of a pump having a pressure relief passage (26) between the ends of the plunger stroke and asserts that it would have been obvious to modify Masahiko "by placing the spill in an intermediate position because the effect would have been the same and this approach was commonly used" (answer, page 6). As explained below, we cannot agree with the examiner that the effect would have been the same.

Where the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, the proposed modification would not have been obvious. In re Gordon, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984).

To move the spill passage of Masahiko to a point intermediate the ends of the plunger stroke would render the

spill valve (46, 47, 48) useless from the point at which the front face of the plunger passes the passage until the end of the stroke, as the spill passage would be cut off from the pump chamber (40, 41, 42). Accordingly, we find that one of ordinary skill in the art would not have been motivated to place the spill passage of Masahiko at a point intermediate the ends of the plunger stroke.

Further, unlike the Abe pump which delivers fuel directly to the engine, the electronically controlled fuel injectors (2) of Masahiko, not the fuel pump, determine the injection pulse to be delivered to the engine. Therefore, Abe would not have provided any suggestion to one of ordinary skill in the art to provide a pressure reducing arrangement on the Masahiko pump to produce a pilot pulse at the output of the pump.

For the foregoing reasons, we also reverse the examiner's rejection of claim 23, and claims 25 and 26 which depend therefrom.

CONCLUSION

To summarize, the decision of the examiner to reject claims 1 and 2 under 35 U.S.C. § 102 and claims 3 through 6, 23 and 25 through 27 under 35 U.S.C. § 103 is reversed.

REVERSED

WILLIAM F. PATE, III Administrative Patent Judge	)
JOHN P. McQUADE Administrative Patent Judge	) BOARD OF PATENT) APPEALS) AND) INTERFERENCES
JENNIFER D. BAHR Administrative Patent Judge	)

JDB/pgg
Ernest A. Beutler
Knobbe, Martens, Olson & Bear
620 Newport Center Drive
Sixteenth Floor
Newport Beach, CA 92660